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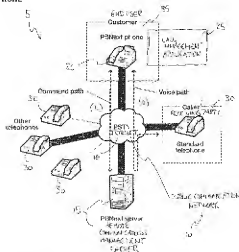
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- (54) Title: METHOD AND APPARATUS FOR TELECOMMUNICATION SYSTEM

PBNEXT PHONE



- (57) Abstract:** The present invention describes a telecommunication system (5) that is essentially a hosted PBX communication system that provides the end user (35) with all of the features and functionality of a hardware based PBX system. The telecommunication system (5) includes at least one public communication network (10), a remote communication management server (15); an end user communication device (20), and a call management application (25) configured to enable communication between the remote communication management server (15) and an end user (35) for call control of incoming and outgoing phone calls. The end user communication device (20) is directly connected to the public communication network (10) and indirectly connected to the remote communication management server (15) such that the incoming and outgoing phone calls are routed from the public communication network (10) to the remote communication management server (15). The remote communication management server (15) preferably provides, among other things, call switching and call processing services.

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**METHOD AND APPARATUS FOR TELECOMMUNICATION SYSTEM****FIELD OF INVENTION**

The present invention generally relates to communication systems. More particularly, the present invention relates to an improved system and method for a business telecommunication network.

**INCORPORATION BY REFERENCE**

The contents of each U.S. patent or other reference, if any, cited in this application, are hereby incorporated by reference.

**BACKGROUND OF INVENTION**

The telephone is arguably one of the most important business tools. In a business setting, for example, people may use the phone to talk to clients and vendors when they have a question or problem, place orders, or simply to establish or re-affirm business relationships.

The simplest telephone is the home phone. In this regard, the telephone was first used to connect two locations on a point-to-point basis. However, it was quickly realized that the real advantage of the telephone lay in giving people access to multiple locations. Access was originally accomplished through the use of a central switchboard where operators manually established a connection between calling parties. Today, as part of the Public Switched Telephone Network (PSTN), a public central telephone switching office (CO) provides connections that are enabled only for the period during which two parties are connected. Typically, the CO serves all subscribers within a local area through a local loop (connection between a subscriber and a central office). In this regard, the CO switch is the core network element that establishes temporary circuit connection between two subscribers. As shown in Figure 1, to accomplish this task, the CO switch must terminate subscriber lines and trucks (switch-to-switch connections). Each central office is in turn connected to other switching centers in the metropolitan area, across the United States and around the world.

The use of a central telephone exchange for the switching of telephone calls became the foundation for later growth and expansion to including PC-based phone systems and satellite telecommunications. In this regard, the telephone gives tremendous communication power to any individual or business.

From a business standpoint, a small business could have just one telephone connected to one local central office line. However, as the business grows it frequently will require multiple telephone and CO lines. To address the small business needs, a telephone system is often installed. There are several different types of phone systems currently available that allow business to exchange voice and data information. These systems include, Key Telephone System (KTS), Private Branch Exchange (PBX), and Centrex, to name a few.

Key systems are typically used for offices of fewer than 40 stations. Key system units may use a central control unit called the key system unit (KSU) to house the system's call processing control, port interface cards, and a variety of system/service circuit cards, to name a few. As shown in Figure 2, with a KTS system two or more telephones terminate two or more central office lines on each set. This allows for telephone features such as call forwarding, in office extension dialing, voice mail options, and prevents others users from accidentally picking up a line that is being used. All outside PSTN telephone lines connect to the KSU, as well as all inside extensions.

For a company of more than 40 employees, there are private networks such as a PBX system. As shown in Figure 3, with a PBX system each phone, instead of being connected to a telephone central switching office, each phone is connected to the PBX. In other words, the PBX system is an in-house telephone switching system that interconnects telephone extensions to each other, as well as having one or more dedicated outside telephone lines to the PSTN generally through a T-1 carrier line. To call within the facility a user typically dials a 2, 3, or 4 digit number or extension. To access a public number, a second scenario is

typically used PBX line 197. For example, a user is given access to the public network; this creates a line appearance on a CO switch where a dial tone is obtained and passed to the user. The user then dials the public telephone number. Calls into the PBX system are routed by a switchboard, console, or similar device located somewhere in the building where the telephone lines enter and exit the facility.

PBXs allow for organizations to have flexible telephone system designed for their specific needs and changeable over time. PBXs may have simple or complex capabilities that are enabled and/or controlled by software and typically include features such as call forwarding or transfer, conference calling, music-on-hold, automated attendant, and call accounting. Accordingly, the configuration of a PBX system is totally programmable, so PBX systems can support the most complex features.

Typically, PBX lines can be installed and maintained by the private company or leased from a network provider. PBX systems including hardwiring and software may require a substantial capital investment by the business to purchase, install, and maintain. By one estimate, PBX systems start anywhere from \$800-\$1000 per line and require the business to purchase or lease additional equipment to keep pace with the businesses' growth. In addition, as indicated above, most PBXs must be programmed and serviced by the organization thus adding to the expense and technical expertise needed to maintain the PBX system.

Out-sourcing provides businesses with an alternative to purchasing or leasing of equipment needed to provide businesses with advanced telecommunications capabilities. Centrex service is one such out-source service. As shown in Figure 4, with Centrex the switching function is performed in the local central switch office. Each centrex telephone and the operator's console are directly connected to the CO. Typically, the centrex system and similar type out-source services still provide limited phone features, may require

extensive and complicated manual data entry to access such features, and provides no user interface/menu for the modification or scalability of phone and data communication features to suit the varying needs of each business.

Regardless of telecommunication method, systems are generally categorized as either digital or analog systems. When the first digital PBXs were introduced in the mid-1970s the internal switching networks required a conversion of analog wave signals into digital transmission format. Voice audio signals from the desktop telephone to the PBX common equipment hardware were transmitted where a codec embedded on a port circuit card converted the analog signal into a digital signal for transmission across the internal circuit switched network. When digital telephones were introduced in 1980, the codec function resided in the desktop instrument itself, and transmission to the PBX common equipment was in digital format through a special cable which places limitations on the compatibility of such phones to existing facility wiring and termination points.

Today, office telephone systems communicating with digital technology have become the industry standard. This means that sound is transmitted as bits of data rather than audio waves. Theoretically, digital transmission has many advantages over analog transmission. Digital signals are less affected by interference and line degradation, meaning that digital lines have virtually no static or hiss. Most businesses, however, make outgoing calls over regular phone lines. This means that even digital phone systems must convert signals back to analog waves through the use of a modem or similar converter type device whenever a call leaves the office. The main reason for digital system use is for data communication. In this regard, these office telephone systems tend to be better equipped to connect with accessories such as voice mail or call ID.

An emerging trend in telecommunications is the use of packet-switching technology for transporting voice traffic. The packet-switching protocol of choice today is generally the

Internet Protocol (IP). The packet-switching method provides several advantages over circuit switching. Packet-switching allows several telephone calls to occupy the amount of space occupied by only one telephone in a circuit-switched network. More voice calls can share trunks in a packet mode network than in a circuit-switching network. The reason for increased voice traffic is the nature of multiplexing in a packet-switching network. As users have something to say, bandwidth is allocated to these users. When a user is idle or not talking no bandwidth is used thus free-up space for another voice communication. In other words, packet switching is very efficient. It minimizes the time that a connection is maintained between two systems, which reduces the load on the network. It also frees up the two systems communicating with each other so that they can accept information from other systems as well. Besides being a more efficient method of voice and/or data communication, Internet based communication may provide a more cost-effective approach to telecommunications for many businesses.

To date, the U.S. Federal Communications Commission (FCC) appears to be taking a hands-off approach to regulating Internet protocol communications such as those used in voice-over (VoIP) technology. Consequently, VoIP vendors can continue to provide small businesses with a choice as to which type of telephone service they use.

In this regard, telephone equipment and computers may be set-up and connected to use voice-over (VoIP) technology to enable the transmission of telephone calls over a data network such as a local area network (LAN), wide area network (WAN), and/or Internet through the use of a gateway. Gateways are used to connect devices on two different types of networks so that they can communicate with each other. Accordingly, the PBX-type network may be considered a gateway because it typically is capable of converting the standard circuit-switched signal from each phone into digital data that can be sent over a packet-switched, IP-based network. Previously, VoIP technology required both callers to be at a

computer using the same software. Now, VoIP calls typically connect to the standard phone network, allowing a VoIP user to call anyone in the world.

Regardless of telecommunication system type used by businesses, all such existing systems with accompanying technology lack a reliable and cost effective approach to system design that provides the end user with all of the features and functionality of a hardware-based PBX system at a significantly reduced set-up cost (equipment and installation) to the end user due to, among other things, improved system connectivity

Accordingly, there is a need for an improved business telecommunication system and method having at least one public communication network, a remote communication management server, an end user communication device; and a call management application configured to enable communication between the remote communication management server and an end user for call control of incoming and outgoing phone calls. Where the end user communication device is directly connected to the public communication network and indirectly connected to the remote communication management server such that the incoming and outgoing phone calls are routed from the public communication network to the remote communication management server. The remote communication management server provides call switching and call processing services.

The system being easily scalable to adapt to changing business size while the end user communication device may include an interface for immediate call control verification by the end user.

## SUMMARY

The present invention describes an telecommunication system that is essentially a hosted PBX communication system that provides the end user with many of the features and functionality of a hardware-based PBX system at a significantly reduced set-up cost



equipment and installation) to the end user due to, among other things, improved system connectivity.

As described herein, the telecommunication system preferably includes at least one public communication network, a remote communication management server, an end user communication device, and a call management application configured to enable communication between the remote communication management server and an end user for call control of incoming and outgoing phone calls. The remote communication management server provides call switching and call processing services.

In one embodiment, the end user communication device will typically have at least one call-processing feature and may include an interface for call control verification. In another embodiment, call-processing features may reside on a computer or similar device where a computer monitor may act as an interface for call control verification or confirmation.

The end user communication device is directly connected to at least one public communication network and indirectly connected to the remote communication management server. In this manner, incoming and outgoing end user phone calls are routed from the public communication network to the remote communication management server. Consequently, direct connectivity of the end user to at least one public communication network permits the end user to utilize standard telecommunication connections without the need for modifying or altering the facility's already existing telecommunications set-up.

#### **DETAILED DESCRIPTION OF THE DRAWINGS**

FIG. 1 shows a basic connection of a home phone to a telephone central office.

FIG. 2 shows basic key telephone system (KTS) connectivity.

FIG. 3 shows basic private branch exchange (PBX) system connectivity.

FIG. 4 shows basic centrex system connectivity.

FIG. 5 depicts a telecommunications system in accordance with one embodiment of the present invention showing the communication connectivity for an incoming call to an end user and an outgoing call from the end user connected directly to a public communication network.

FIG. 6 illustrates a telecommunications system in accordance with another embodiment of the present invention showing communication connectivity for an incoming call to an end user and an outgoing call from the end user connected directly to two different public communications networks and a caller or receiving party connected to at least one of the aforementioned communication networks.

FIG. 7 shows a telecommunications system in accordance with still another embodiment of the present invention showing the communication connectivity when the end user and caller or receiving party are connected directly to two different public communication networks.

### DETAILED DESCRIPTION

Embodiments of the present invention will now be described with reference to the accompanying Figures, wherein like reference numerals refer to like elements throughout. The terminology used in the description presented herein is not intended to be interpreted in any limited or restrictive manner, simply because it is being utilized in conjunction with a detailed description of certain embodiments of the invention. Furthermore, various embodiments of the invention (whether or not specifically described herein) may include several novel features, no single one of which is solely responsible for its desirable attributes or which is essential to practicing the inventions herein described.

The business telecommunication system of the present invention is essentially a hosted PBX communication system that provides an end user with all of the features and functionality of hardware-based PBX systems at a significantly reduced set-up cost

equipment and installation) to the end user due to, among other things, improved system connectivity.

As used herein, the term end user will generally refer to any person(s) or entity(s) including person(s) employed by the entity(s) or associated with the entity(s) whose telecommunication device(s) or system(s) is enabled by the present invention. Typically, the end user will be a customer or subscriber that compensates an organization supplying the hardware and/or software associated with the present invention.

As further used herein, the term caller will generally refer to any person(s) or entity(s) other than those person(s) or entity(s) termed as an end user. However, person skilled in the art will understand the use of the present invention may be used to communicate between two or more end users. For example, when one person (end user) dials the extension of a second person (end user) within the same facility. In this scenario, the distinction between end user and caller becomes irrelevant.

Although primarily directed toward small to medium sized businesses, persons of ordinary skill in the art will understand that individuals, solo practitioners, and the like, may also derive benefits from the present invention. In this regard, the present invention promotes a professional company image by providing the user with professional call-processing features such as voice mail, conferencing, and interactive music on-hold, for example.

The telecommunications systems preferably includes at least one public communication network, a remote communication management server, an end user communication device, and a call management application configured to enable communication between the remote communication management server and an end user for call control of incoming and outgoing phone calls. The end user communication device is directly connected to at least one public communication network and indirectly connected to the remote communication management server. In this manner, the incoming and outgoing

end user phone calls are routed from the public communication network to the remote communication management server. Consequently, direct connectivity of the end user to a public communication network permits the end user to utilize standard telecommunication connections without the need for modifying or altering the facility's already existing telecommunications set-up which is typically needed when installing a state-of-the-art phone system having call-processing features similar to those found on PBX-type systems.

Accordingly, businesses utilizing the present invention do not need to expend capital resources on expensive hardware and unpredictable maintenance typically associated with traditional PBX systems. Furthermore, as the present invention utilizes existing facility network connections the system is easily scalable to adapt to changing business size simply by plugging in or removing end user communication devices, as described herein. As such, the present invention offers a reliable, value-packed, easy-to-use alternative to buying or leasing a hardware-based PBX.

The remote communication management server preferably provides, among other things, call switching and call processing services while the end user communication device may include an interface for call control verification or confirmation by the end user. In another embodiment a desktop or laptop computer monitor may function as an interface for call control verification or confirmation by the end user. Such call-processing features provided by the remote communication management server and included in the end user communication device or computer may include any one or more of the following: automated attendant, conferencing, three way calling, incoming fax support, call transfer, "follow-me" features, web-based voicemail, and interactive music-on-hold, to name a few.

In one embodiment, the call management application/software resides within or is incorporated into the end user communication device and functions to facilitate or enable call control communication between the remote communication management server and the end

user such that the end user communication device is capable of possessing call processing features comparable to those associated with a hardware-based PBX system.

In another embodiment, the call management application/software resides on an end user computer or similar device that may be used for call control and/or call feature modification where the end user may also check voice mail and incoming faxes, manage call menus and call queues. Accordingly, the present invention may include software operating on a conventional computer having a monitor, a processor, and at least one data input device such as a keyboard or a mouse. However, as further discussed herein, any suitable hardware or similar device may be utilized.

As discussed herein, the call management application may reside within or integral with the end user's communication device. As such, the end user communication device will act as a stand-alone phone having the software of the present invention built into the end user communication device. However, in another embodiment the call management application may reside within a computer or similar device. Accordingly, in order to practice the present invention the end user may be considered associated with a stand-alone phone or with a standard phone and a computer system that houses the software to enable call control communication between the remote communication management server and the end user. In other words, regardless of which device (stand-alone phone or computer) actually receives and transmits call control communication data, the end user is associated with that device. Consequently, the call management application may be considered to enable communication between the remote communications management server and the end user.

Further in this regard, if the end user communication device is a stand-alone phone the transmission and reception of voice data and call control commands are both provided for by the communication device. However, if the end user is using a standard phone along with a computer system, for example, voice data will still be transmitted and received via the

phone while call control commands will be communicated by the computer and associated software of the present invention.

As described above, Figures 1-4 represent existing telecommunication systems. More particularly, Figures 2-4, show that existing telecommunication technology places the end user in direct connectivity with a switching and call processing service. In Figure 2, phones (A), (B), and (C) are directly connected to the KTS which provides the switching function. In Figure 3, telephones (A) and (B) are directly connected to a PBX system which provides the switching function, and in Figure 4, phones (A), (B), and (C) are directly connected to a Centrex service that is typically provided by the telephone central office. Accordingly, each of the aforementioned telecommunication systems require hardware other than that typically found when an end user is directly connected to a public communications network such as the PSTN, as shown in Figure 1. However, as shown in Figure 1, the end user does not have access to a switching and processing call service.

Turning now to Figure 5, a telecommunications system in accordance with one embodiment of the present invention showing the communication connectivity for an incoming call to an end user and an outgoing call from the end user connected directly to a public communications network is shown. In this embodiment, the telecommunication system 5 of the present invention preferably includes at least one public communication network 10, a remote communication management server 15, an end user communication device 20, and a call management application 25 configured to enable communication between the remote communication management server 15 and an end user 35 for call control of incoming and outgoing phone calls. The end user communication device 20 is directly connected to the public communication network 10 and indirectly connected to the remote communication management server 15 such that the incoming and outgoing phone calls are

route from the public communication network 10 to the remote communication management server 15.

As shown, the end user communication device 20 may be represented by a cell phone, PDA, hardwired phone, or similar type device capable of supporting the call management application 25 of the present invention. Similarly, the call management application 25 may be represented by software that facilitates or enables call control communication between the between the remote communication management server 15 and the end user 35.

In this regard, the remote communication management server 15 preferably provides, among other things, call switching and call processing services that allows the end user communication device 20 to function as single stand-alone communication device possessing all of the call-processing features typically found on very costly hardware-based PBX communication systems. As mentioned previously, these call-processing features may include auto attendant, voicemail, multi-user extensions (queues), full-duplex speakerphone, voicemail forwarding, three-way calling, conference calling, call waiting, caller ID, call waiting ID, interactive hold music, and "follow me" rules, to name a few features. Typically, the end user communication device 20 will include an interface such as screen, touch pad, or other device for visual or audio call control verification or confirmation.

In a typically scenario, a caller 30 placing an inbound or incoming call to the end user 35 connects to a public communications network 10 such as the public switched telephone network (PSTN), as shown by bi-directional arrow (a). The phone call is then routed from the public communications network 10 to the remote communications management server 15, where call switching and processing takes place. In one instance, the caller 30 may hear, "Press 1 for XYZ" (person's name), or "Press 2 for accounting". After the caller 30 makes the appropriate choice, the call is further routed from the remote communication network 15 to the public communications network 10, and then to the end user 35 as designated by the

choice made by the caller 30 in response to the aforementioned prompt. In this manner the call connection is completed between the caller 30 and the end user 35.

After receiving the incoming phone call the end user 35 may talk to the caller 35 or, through at least one call-processing feature, place the caller 30 on hold, transfer the caller, or enable some other call-processing feature/function.

As shown in Figure 5, similar to the voice communication pathway between the caller 30 and the end user 35, the call control command communication pathway between the remote communication management server 15 and the end user 35 is not a direct pathway as call control communication passes through the public communication network 10. This back and forth communication between the end user 35 and the remote communication management server 15 through the public communications network 10 is represented by bi-directional arrow (b). Consequently, direct connectivity of the end user 35 to a public communication network 10 permits the end user 35 to utilize standard telecommunication connections without the need for modifying or altering the facility's already existing telecommunications set-up which is typically required when installing a state-of-the-art phone system having call-processing features similar to those found on PBX-type systems. In today's business world easy installation of telecommunications equipment can equate to a considerable savings for the small and medium size businesses or individual with limited financial resources.

Persons skilled in the art will understand that an outgoing call from the end user 35 to a receiving party will have a voice communication pathway in the opposite direction to those just discussed. For example, an end user 35 placing an outbound or outgoing call will connect to a public communications network 10 such as the public switched telephone network (PSTN), as shown by bi-directional arrow (a). The call is then routed from the public communications network 10 to the remote communications management server 15,



where call switching and processing takes place. The call is then routed from the remote communication network 15 to the public communication network 10, and then on to the intended receiving party (shown in Figure 5 as Other telephones or the caller phone in the previous example). In this manner the call connection is completed between the end user 35 and a receiving party.

As discussed above, after a voice communication link is established between the end user 35 and the receiving party the end user 35 may talk to the receiving party, or, through at least one call-processing feature, place the receiving party on hold, transfer the caller, or enable some other call-processing feature/function. These call-processing features are typically enabled by push buttons on the stand-alone phone or by way an input device such as a mouse or keyboard on connected to a computer or similar device.

As mentioned, in the stand-alone phone embodiment, the call-processing features of the end user communication device 20 function due to a call management application/software 25 configured to enable communication between the remote communication management server 15 and the end user 35. Again, the important point to remember is that the end user communication device 20 is directly connected to the public communication network 10 and indirectly connected to the remote communication management server 15.

In the stand-alone phone embodiment of the present invention, the end user communication device 20 may include an interface such as a screen or other visual/audio indicator for call control verification or confirmation. For example, when using a cell phone the phone's LCD or plasma display may indicate either by a flashing icon or word display that the caller 30 is on hold or has been sent to voice mail. In another embodiment, a computer screen may act as an interface for call control verification.

The aforementioned example was discussed as if the end user 35 and the caller 30 were directly connected to a public communications network 10 such as the PSTN. However, person skilled in the art will understand that the present may be practiced with the end user 35 and caller 30 directly connected the another public communication network 10 such as the Internet via VoIP capable communication devices.

Turning now to Figure 6, a telecommunications system in accordance with another embodiment of the present invention showing communication connectivity for an incoming call to an end user and outgoing call from the end user connected directly to two different public communication networks and a caller or receiving party connected to at least one of the aforementioned public communication networks is shown.

In the embodiment shown in Figure 6, the end user 35 is associated with a standard phone and computer system capable of utilizing the call management application/software 25 of the present invention to enable communication between the remote communication management server 15 and the end user 35 for call control of the incoming and outgoing phone calls.

Similar to previous example, the end user voice and call control command pathways are directly connected to a public communication network 10a, 10b and indirectly connected to the remote communication management server 15.

As shown, the end user communication device 20 is standard phone (not having software incorporated into the phone) directly connected to the PSTN to enable voice data communication between the end user 35 and a caller 30. Regardless of whether the end user 35 is receiving an incoming call or placing an outgoing call the voice data pathway is as previously described. Although a standard phone is used for discussion purpose, it should be understood that the stand-alone phone discussed might be utilized will deriving the benefits provided by the present invention.

However, as shown in Figure 6, the call management application/software 25 that enables communication between the remote communication management server 15 and the end user 35 resides on a computer system. Accordingly, call control/command data that was previously communicated via the PSTN is now communicated via the Internet. For simplicity, the connection from the end user computer to the Internet is shown as a direct connection. However, as will be understood by those persons skilled in the art, there are various methods to connect to the Internet that may or may include other public communication networks, servers, etc. As with the previous embodiment, the important point to remember is that the end user communication device 20 is directly connected to a public communication network 10 and indirectly connected to the remote communication management server 15.

Figure 7 shows a telecommunications system in accordance with still another embodiment of the present invention showing the communication connectivity when the end user and the caller are connected directly to two different public communication networks.

In this embodiment, the end user 35 through VoIP technology is directly connected to the public communication network known as the Internet and indirectly connected to the remote communication management server 15. Accordingly, command data is communicated via an Internet connection to the remote communication management server 15 and voice data intended for a receiving party is communicated from the end user 35 to the remote communication management server 15, and from the remote communication management server 15 to the intended receiving party. As with the previous embodiments, the remote communication management server 15 preferably provides, among other things, call switching and call processing services. Similarly, the caller 30 or receiving party is connected to the end user 35 via a connection to the PSTN, from the PSTN to the remote

communication management server 15, and from the remote communication management server 15 to the end user 35.

The system and methods of the present invention have been described with some particularity, but the specific designs, constructions and steps disclosed are not to be taken as delimiting the invention. Obvious modifications will make themselves apparent to those of ordinary skill in the art, all of which will not depart from the essence of the invention and all such changes and modifications are intended to be encompassed within the appended claims.

What is claimed is:

1. A telecommunication system, comprising:
  - at least one public communication network;
  - a remote communication management server;
  - an end user communication device; and
  - a call management application configured to enable communication between the remote communication management server and an end user for call control of incoming and outgoing phone calls, the end user communication device being directly connected to the public communication network and indirectly connected to the remote communication management server such that the incoming and outgoing phone calls are routed from the public communication network to the remote communication management server;wherein the remote communication management server provides call switching and call processing services.
2. The telecommunication system of Claim 1, wherein the incoming and outgoing end user phone calls are further routed from the remote communication management server to the public communication network.
3. The telecommunication system of Claim 1, wherein the public communication network is the public switched telephone network (PSTN) for the transfer of at least voice and command data.
4. The telecommunication system of Claim 1, wherein the public communication network is the Internet for the transfer of at least voice and command data.
5. The telecommunication system of Claim 1, wherein the public communication network is the Internet for the transfer command data.
6. The telecommunication system of Claim 5, further including a public communication network other than the Internet for the transfer of voice data.

7. The telecommunication system of Claim 6, wherein the other public communication network is the public switched telephone network (PSTN).

8. A telecommunication system, comprising:

at least one public communication network;

a remote communication management server;

an end user communication device;

a voice pathway;

a call control pathway; and

a call management application configured to utilize the call control pathway to enable communication between the remote communication management server and an end user for call control of incoming and outgoing phone calls, the call control pathway and voice pathway directly connected to the public communication network and indirectly connected to the remote communication management server such that the incoming and outgoing phone calls are routed from the public communication network to the remote communication management server;

wherein the remote communication management server provides call switching and call processing services.

9. The telecommunication system of Claim 8, wherein the public communication network is the public switched telephone network (PSTN) for the transfer of at least voice and command data.

10. The telecommunication system of Claim 8, wherein the public communication network is the Internet for the transfer of at least voice and command data.

11. The telecommunication system of Claim 8, wherein the public communication network is the Internet for the transfer command data.

12. The telecommunication system of Claim 11, further including a public communication network other than the Internet for the transfer of voice data.

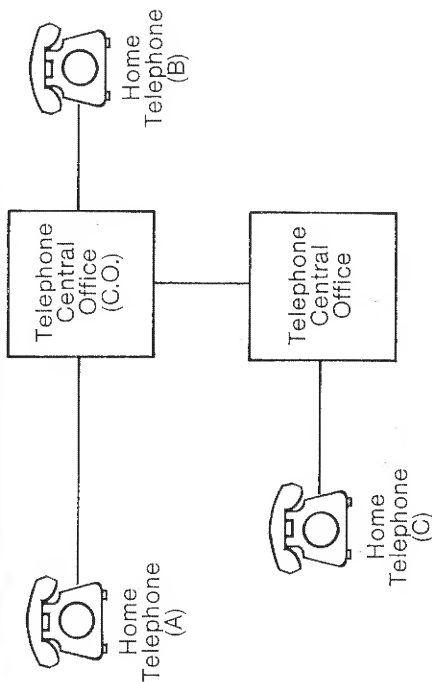
13. The telecommunications system of Claim 12, wherein the other public communication network is the public switched telephone network (PSTN).

14. The telecommunication system of Claim 8, wherein the incoming and outgoing end user phone calls are further routed from the remote communication management server to the public communication network.

15. A method of telecommunication, including:

providing the system of Claim 1 or Claim 8; and

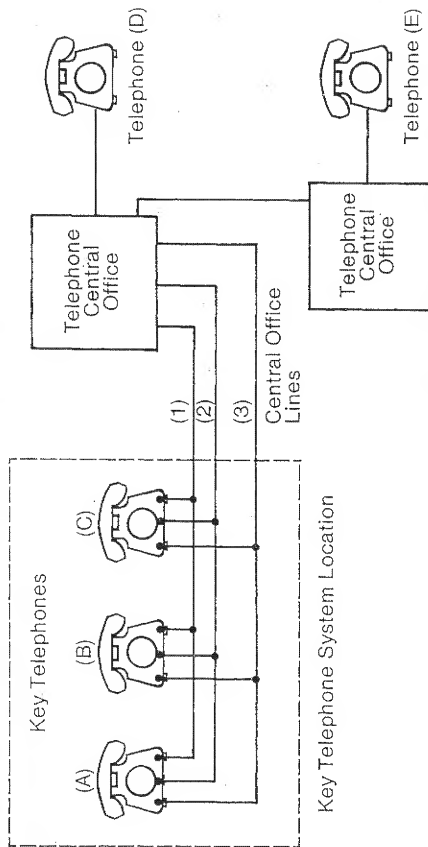
providing said call switching and call processing services with said remote communication management server.

**BASIC  
TELEPHONE CONNECTION**

The home telephone user at (A) is connected to a local telephone central office. The user can reach telephone (B) via this office. He can also reach telephone (C) via an intermediate central office.

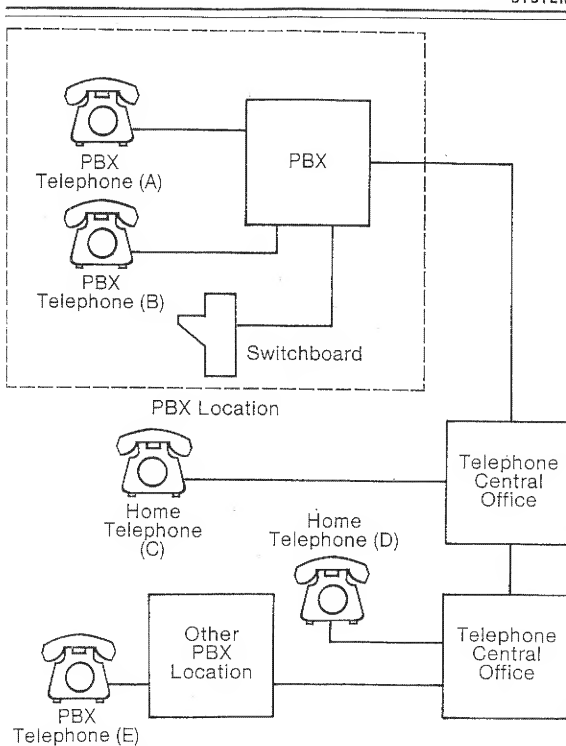
FIG. 1



KEY TELEPHONE  
SYSTEM

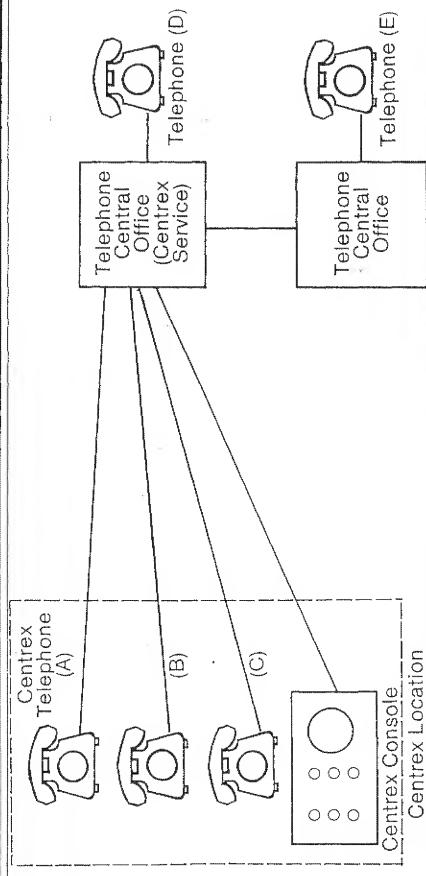
Key telephone (A), (B) and (C) each contain the same three central office telephone lines. Key telephone user (A) can call telephone (D) or (E) by dialing their telephone number. Telephone user (D) and (E) can dial either of the three key telephone central office lines and all three key telephones (A), (B), and (C) will ring.

Fig. 2.

PBX  
SYSTEM

The PBX telephone user at (A) is connected to a PBX system. This user can reach telephone (B) via this PBX. He can also reach telephone (C), (D) or (E) via his own PBX and other telephone central offices.

FIG 3

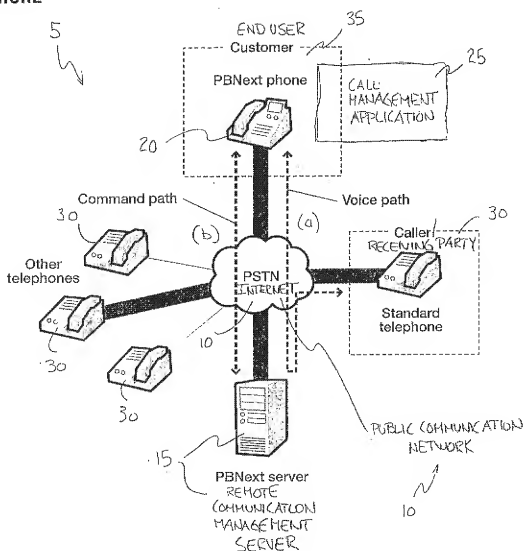
CENTREX  
SYSTEM

The telephone user at (A) is connected to a centrex system located in the local telephone central office. This user can reach telephone (B) or (C) through the centrex system. This user can reach telephones (D) or (E) by dialing the digit 9 and their telephone number. Telephone users at (D) or (E) can reach telephones (A), (B) or (C) by dialing their centrex telephone number. If the centrex numbers are not known, the main centrex console can be called and the operator can connect the call to telephone (A), (B) or (C).

FIG. 4

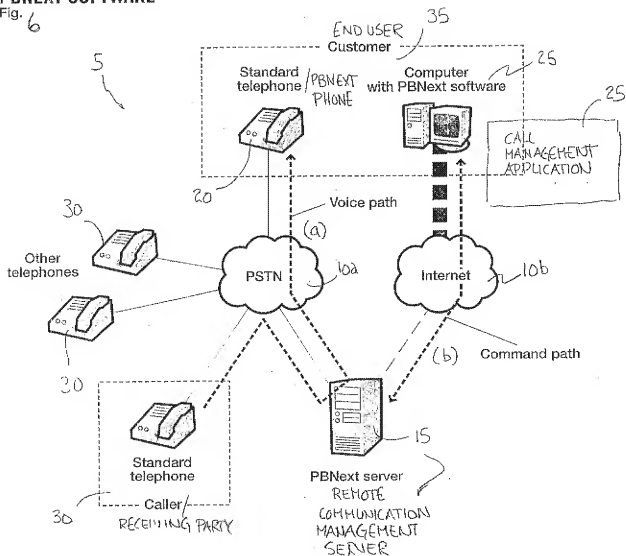
## PBNEXT PHONE

Fig. 5



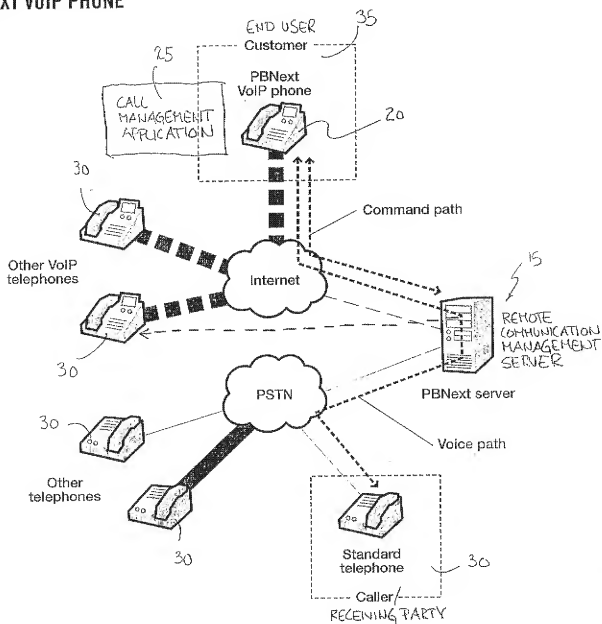
## PBNEXT SOFTWARE

Fig. 6



**PBNEXT VoIP PHONE**

Fig. 7



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/02706

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : H04L 12/16; H04M 3/42; G06F 15/16

US CL : 370/260; 379/202; 709/204,229

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/260; 379/202; 709/204,229

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,654,455 B1 (ISAKA) 25 November 2003 (25.11.2003).	1-15
A	US 6,584,094 B2 (MAROULIS et al.) 24 June 2003 (24.06.2003).	1-15
A	US 6,404,746 B1 (CAVE et al.) 11 June 2002 (11.06.2002).	1-15
X	US 6,539,077 B1 (RANALLI et al.) 25 March 2003 (25.03.2003), see entire document.	1-15

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

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"B" document: member of the same patent family

Date of the actual completion of the international search

25 July 2004 (25.07.2004)

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US

Commissioner for Patents

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